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# Thermodynamic limitations of the reptation model

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## Abstract

The paper deals with the question whether the tube/reptation model of polymer chain dynamics is compatible with general laws of statistical physics. Based on a relation between the mean squared fluctuation of the number of segments in a given volume element and the isothermal compressibility of the polymer system, it follows straightforwardly that the tube/reptation model predicts fluctuations larger than permitted by thermodynamics on the time scale $t \gtrsim \tau_R$, where $\tau_R$ is the Rouse relaxation time. 

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## Keywords

Chain dynamics, Fluctuations, Polymer melts, Reptation, Thermodynamics